

CLAIMS

1. Cylinder head gasket with an at least substantially metallic gasket plate comprising at least one sheet metal layer and having at least one combustion chamber opening surrounded by at least one bead formed in a sheet metal layer of said gasket plate and being elastically deformable in height, wherein for delimiting such deformation of said bead at least one of said sheet metal layers is provided with at least one delimiting device close to said bead, said delimiting device having at least one deformation in said sheet metal layer such that
  - (a) in sections through said at least one sheet metal layer along circular cylindrical surfaces coaxial with said combustion chamber opening, said delimiting device respectively comprises a row of discrete elevations following one another in a circumferential direction of the combustion chamber opening, and, located directly opposite each of said elevations, a discrete depression corresponding in shape to the shape of the elevation associated therewith, said elevations being joined to one another by the sheet metal of said at least one sheet metal layer;
  - (b) in a plan view of said at least one sheet metal layer, (i) the total area occupied by all of said elevations is at least equal to half of the total area occupied by said delimiting device, and (ii) the shape of said elevations differs from the shape of circular arcs at least partly surrounding said combustion chamber opening; and

- (c) where said at least one sheet metal layer is provided with said at least one deformation, the total thickness of said sheet metal layer is greater than the thickness of the undeformed sheet metal.
- 2. Cylinder head gasket in accordance with Claim 1, wherein in sections through the sheet metal layer along circular cylindrical surfaces coaxial with the combustion chamber opening the crests of the elevations to be pressed against a neighboring sealing surface when the gasket is installed form with this sealing surface a contact zone which encloses the combustion chamber opening but is interrupted in a circumferential direction of said combustion chamber opening.
- 3. Cylinder head gasket in accordance with Claim 1, wherein the crests of the elevations extend approximately parallel to the plane of the sheet metal layer.
- 4. Cylinder head gasket in accordance with Claim 3, wherein the elevations have an approximately U-shaped cross section in sections through the sheet metal layer along circular cylindrical surfaces coaxial with the combustion chamber opening.
- 5. Cylinder head gasket in accordance with Claim 1, wherein the elevations are at least almost inelastic under the pressure forces exerted on the elevations during operation of the engine.
- 6. Cylinder head gasket in accordance with Claim 1, wherein the elevations have at least almost no plastic properties under the pressure forces exerted on the elevations during operation of the engine.

7. Cylinder head gasket in accordance with Claim 1, wherein the material of the sheet metal layer in the area of the elevations is cold-worked by deformation up to almost the breaking limit.
8. Cylinder head gasket in accordance with Claim 1, wherein the elevations lie close to one another with at least almost no spacing between them in a plan view of the sheet metal layer.
9. Cylinder head gasket in accordance with Claim 1, wherein the spring rate of the delimiting device, measured perpendicularly to the sheet metal layer, is greater than that of the neighboring bead all around the combustion chamber opening.
10. Cylinder head gasket in accordance with Claim 1, wherein the total thickness of the sheet metal layer in the area of the delimiting device is smaller than in the area of the neighboring bead all around the combustion chamber opening.
11. Cylinder head gasket in accordance with Claim 1, wherein a device for delimiting the deformation is provided for each combustion chamber opening.
12. Cylinder head gasket in accordance with Claim 1, wherein the delimiting device is arranged radially within the neighboring bead.
13. Cylinder head gasket in accordance with Claim 1, wherein only a single device for delimiting the deformation is provided for each combustion chamber opening.

14. Cylinder head gasket in accordance with Claim 1, wherein the bead lying close to the delimiting device is of circular design in a plan view of the sheet metal layer.
15. Cylinder head gasket in accordance with Claim 1, wherein the delimiting device forms a two-dimensional pattern of discrete elevations in a plan view of the sheet metal layer.
16. Cylinder head gasket in accordance with Claim 15, wherein the elevations form a regular pattern.
17. Cylinder head gasket in accordance with Claim 15, wherein in a plan view of the sheet metal layer the spacings F between neighboring elevations are smaller than the maximum diameters G of the elevations so that  $0 \leq F < G$  applies.
18. Cylinder head gasket in accordance with Claim 15, wherein all elevations are of approximately the same design in a plan view of the sheet metal layer.
19. Cylinder head gasket in accordance with Claim 15, wherein the elevations are of knob-like design.
20. Cylinder head gasket in accordance with Claim 15, wherein the elevations form a honeycomb pattern in a plan view of the sheet metal layer.

21. Cylinder head gasket in accordance with Claim 1, wherein the elevations are formed by at least one bead which in a plan view of the sheet metal layer surrounds the combustion chamber opening in at least almost closed configuration and forms over at least part of its length an at least almost complete meander extending in a circumferential direction of the combustion chamber opening.
22. Cylinder head gasket in accordance with Claim 21, wherein the device for delimiting the deformation is formed by a single bead.
23. Cylinder head gasket in accordance with Claim 1, wherein in a plan view of the sheet metal layer the elevations are formed by a ring of beads which encloses the combustion chamber opening, said beads extending approximately in a radial direction with respect to the combustion chamber opening.
24. Cylinder head gasket with an at least substantially metallic gasket plate comprising at least one sheet metal layer and having several combustion chamber openings, each being surrounded by at least one first bead formed in a sheet metal layer of said gasket plate and having a spring rate so as to be elastically deformable in height, wherein for delimiting the elastic deformation of said first bead at least one delimiting device is associated with each of said first beads, said delimiting device being close to the respective first bead, surrounding the respective combustion chamber opening and being obtained by deformation of a sheet metal layer of said gasket plate such that

- (a) said delimiting device is formed by at least one second bead of said deformed sheet metal layer, said second bead having a spring rate and, in a plan view of said deformed sheet metal layer, surrounding the associated combustion chamber opening at least almost completely and forming over at least part of the length of said second bead an at least almost complete meander extending in a circumferential direction of said combustion chamber opening;
- (b) all around the respective combustion chamber opening the spring rate of the second bead is greater than the spring rate of the associated first bead when measured perpendicularly to said gasket plate;
- (c) in a plan view of said gasket plate, the second bead is disposed between the associated combustion chamber opening and the associated first bead;
- (d) the height of the second bead is selected so as to allow an elastic deformation of the associated first bead; and
- (e) in a plan view of the deformed sheet metal layer the total area occupied by the second bead is at least equal to half of the total area occupied by said delimiting device.

25. Process for the manufacture of a cylinder head gasket in accordance with claim 1, wherein the elevations are first produced with a larger height than their final height and are then reduced to their final height by such a partial reverse deformation of the sheet metal layer that their cross section in circular cylindrical surfaces coaxial with the combustion chamber opening is approximately rectangular or trapezoidal.